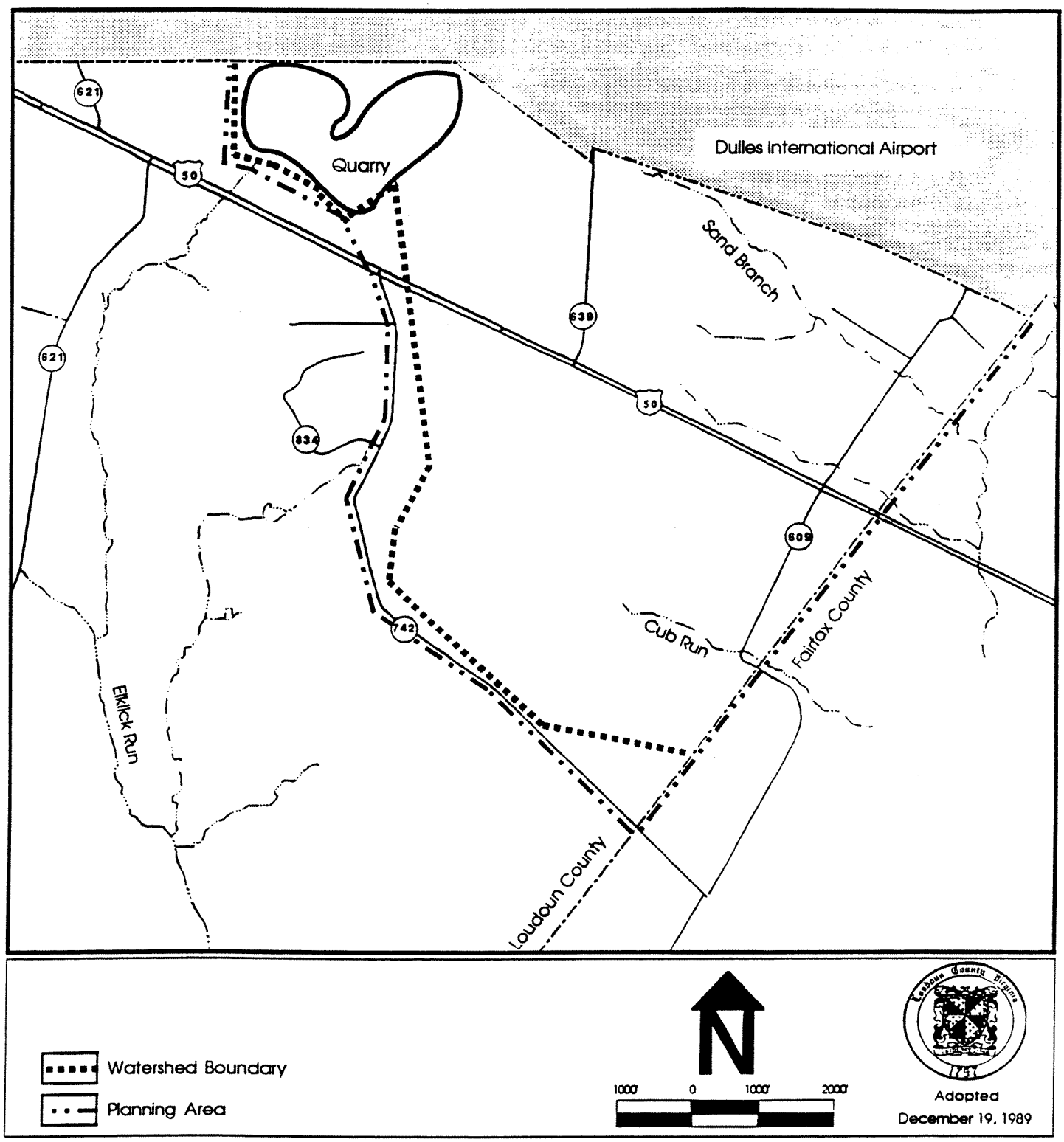
Chapter 1
Inventory

Base Map • Figure 2



land uses, density and character of development, transportation improvements and public facilities and utilities;

2. Provide guidance to coordinate actions between the County and public agencies such as the Loudoun County Sanitation Authority (LCSA), the Virginia Department of Transportation and the Metropolitan Washington Airports Authority;

3. Provide guidance to coordinate actions among citizens, residential developers, industrial and office developers, and retail and service investors;

4. Establish specific County goals and policies for guiding the development of land and public improvements in the area during the next 10 to 20 years.

B. Planning Process

The County's comprehensive planning program provides the basis for land use and zoning decisions and consists of several related elements (See Figure 3, page 5). The initial plan that provides a basis for all subsequent plans is the *Resource Management Plan (RMP)*, adopted in 1979. The *RMP* consists of general goals and policies that apply to the entire County. Area plans are specific land use plans for particular areas or communities. The area plans use the RMP goals and policies as a basis for developing more detailed land use guidelines for particular planning areas. To date, the County has adopted the *Eastern Loudoun Area Management Plan* (1980), the *Leesburg Area Management Plan* (1982), the *Rural Land Management Plan* (1984), the *Dulles North Area Management Plan* (1985), the *Waterford Area Management Plan* (1988) and the *Round Hill Area Management Plan* (1990). Figure 4, page 6 illustrates the geographical boundaries of the County's various planning areas.

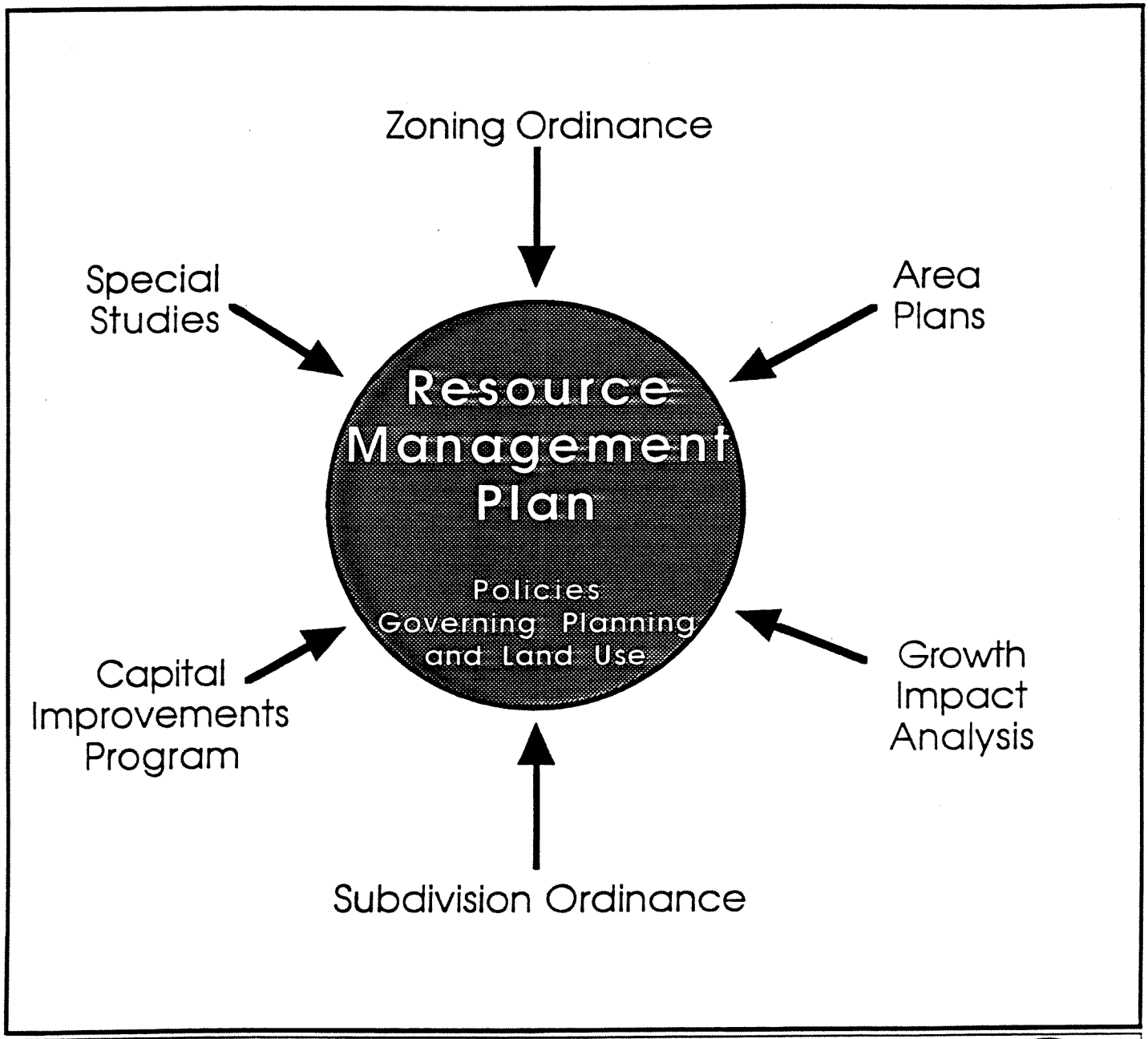
The other essential elements of the County's land management program are the Zoning Ordinance, which regulates the types and intensities of uses that can be located on a property, and the Land Subdivision and Development Ordinance (including the Facilities Standards Manual) which regulates subdivision, site development and construction.

The County has a strong tradition of citizen and community participation in the formulation of area plans. Because these plans affect the overall character of a specific area including land use, development types and intensities, location of roads, utilities and public facilities, the citizens of the specific area should be the fundamental advisors to the Planning Commission and the Board of Supervisors on how the area should develop. The Cub Run Citizen Committee drafting process took nine months and was followed by Planning Commission and Board of Supervisors review. The Planning Commission certified its final version of the draft plan to the Board of Supervisors on October 25, 1989 and the Board adopted the *Cub Run Area Management Plan* on December 19, 1989.

C. Relationship to the Resource Management Plan

The *Resource Management Plan (RMP)*, as a policy document, does not seek to establish specific land use directives for the Dulles South planning area. Rather, it establishes Countywide goals and desirable development patterns which act as a framework for orderly growth, change and decision-making. The RMP goals are grouped into eight major categories which address the conservation and preservation of natural, agricultural and historic resources, the character of housing and mix of housing types, the timing and location of public facilities and utilities, the development of a sensitive and coordinated transportation system, the development of compatible employment and industrial resources and the maintenance of community values and quality of life through careful public spending. While this plan takes its primary goals from the RMP, these general directives are translated into specific policies and guidelines tailored to the unique needs of the Cub Run planning area of Loudoun County.

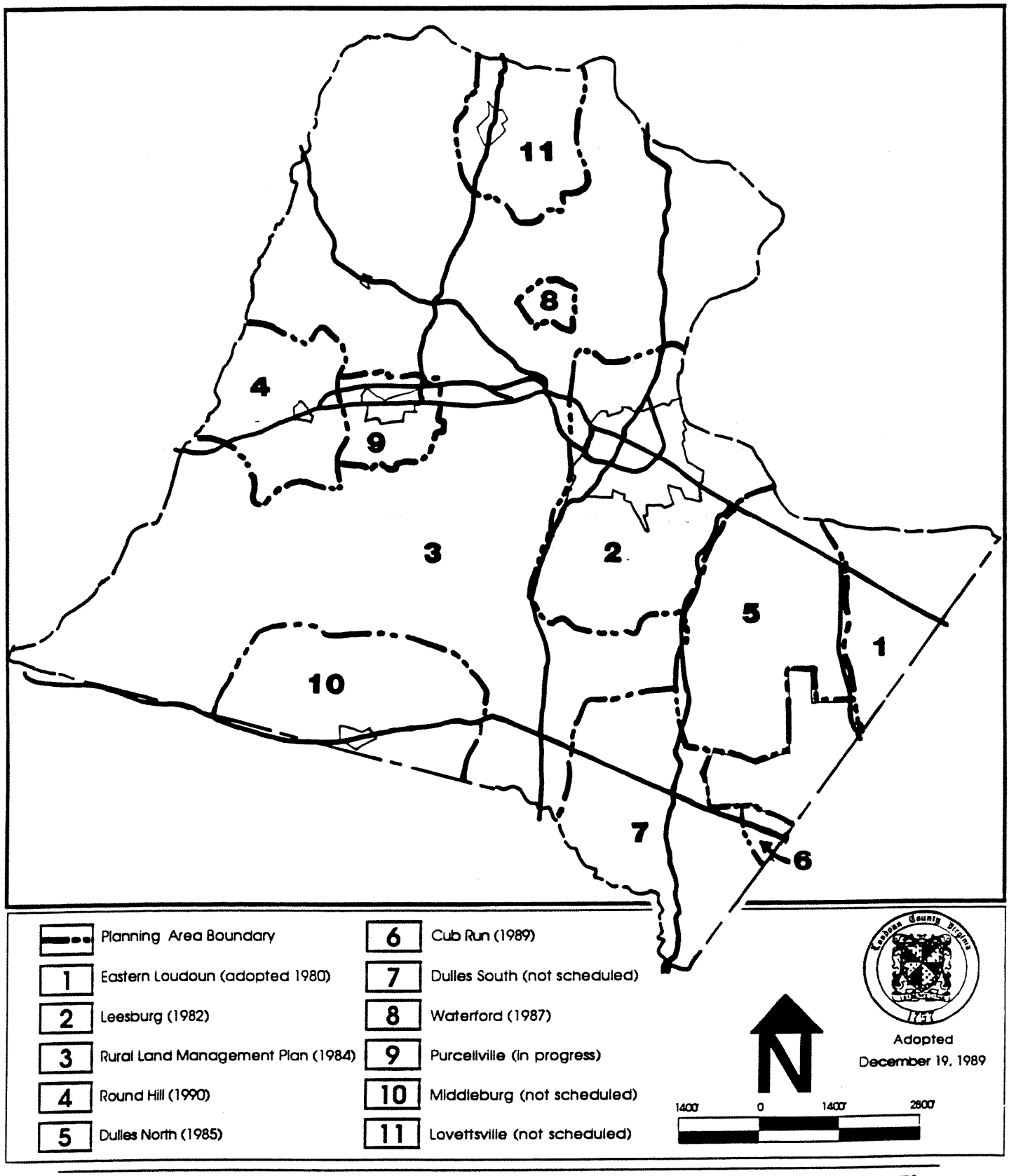
Comprehensive Plan Elements • Figure 3



The Resource Management Plan forms the core document of the County planning program. Special Studies and Area Plans provide detailed guidance in specific areas of the County, while the Zoning and Subdivision Ordinances and the Capital Improvements Program are tools used to implement the County planning program.

Adopted
December 19, 1989

Planning Areas • Figure 4



Chapter One — Inventory

A. Existing Land Uses

Cub Run, a planning area of approximately two square miles or 1,320 acres, lies on the Fairfax County line only seven miles west of the rapidly developing Fair Oaks area. The entire planning area is bisected by Route 50, forming a corridor scattered with commercial establishments, single-family residences and various open space and agricultural uses. To the north of Route 50 is a major quarry of close to 75 acres which, to some extent, has influenced the industrial character of the northern portion of the planning area and the nature of recent development applications. A second major influence on land use in Cub Run is increasing development in nearby areas and consequent demand for land on which to locate construction related businesses. This is particularly evident along Routes 639 and 609 where a number of construction companies and contractors have recently located. Heavy equipment storage is also prevalent in these areas.

Land uses to the south of Route 50 differ significantly from those to the north. While residences are scattered throughout the southern portion of the planning area, most of this land remains wooded or in open fields. Approximately 175 acres of land here is currently in active agricultural use for grass turf and hay production. It is estimated that approximately one-third of the farmland located in the Cub Run planning area is held in absentee ownership. Land use patterns are illustrated in Figure 5, page 9. Table 1, page 7 shows the approximate percentage of land in various uses.

To date, growth has been very slow in this community, largely because the soil is generally not suitable for septic systems and because central sewer or water service is not available. Thus, there has not been a residential or a commercial/ industrial development surge as has been experienced to the east in Fairfax County.

B. Existing Population

The existing population of the Cub Run planning area totaled approximately 140 people in 1987.* This population, which falls within Census Tract 6007, is characterized by the U. S.

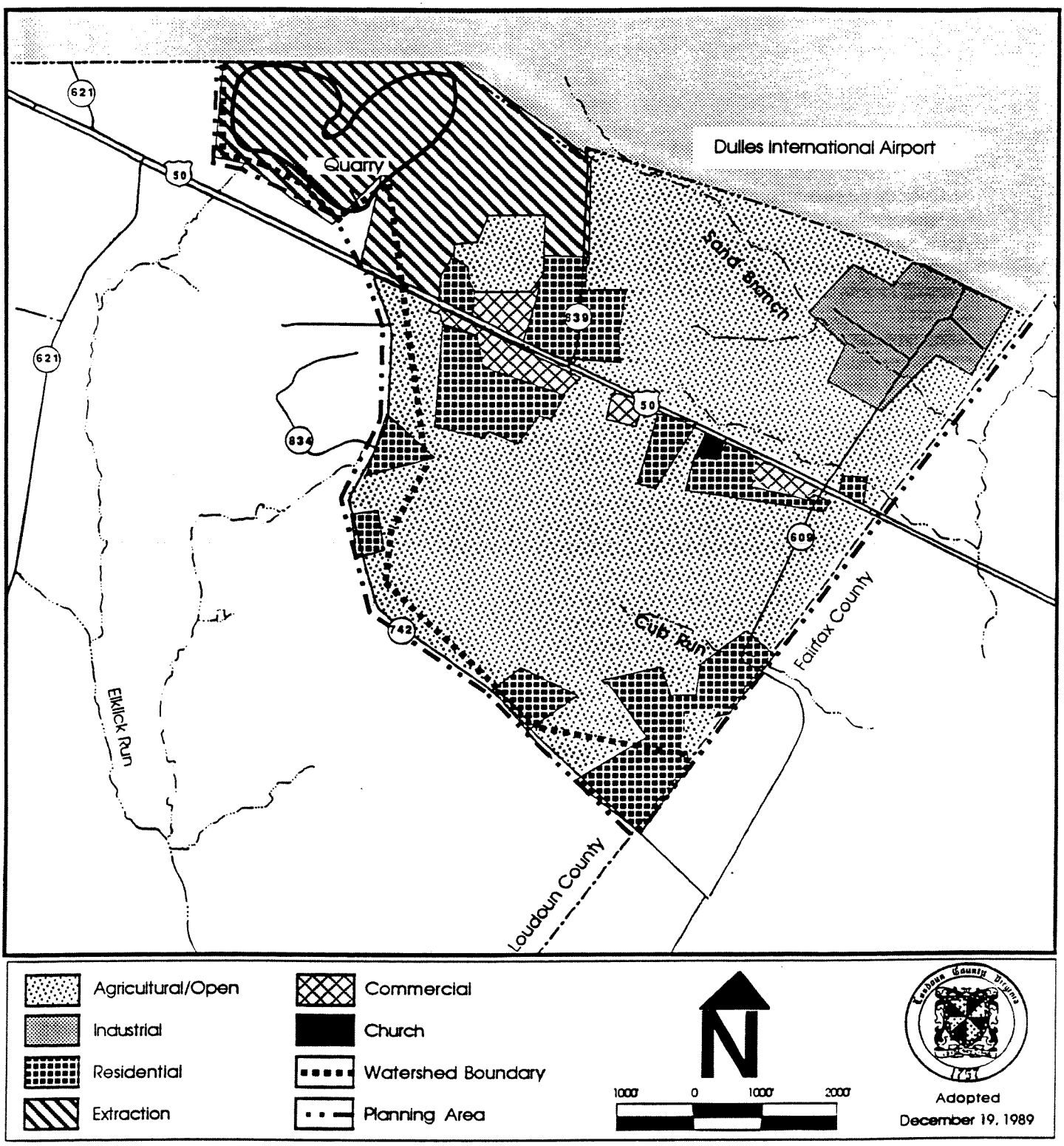
TABLE 1 — Existing Land Uses in the Cub Run Planning Area**

Use	Approximate Acreage	Approximate Percentage
Open Space/Forestal	487	36.9
Agricultural	373	28.2
Extractive Industry	191	14.5
Residential	141	10.7
Industrial	74	5.6
Commercial	53	4.0
Church	1	.1
Total	1,320	100.%

* Compiled by Loudoun County Department of Planning, Zoning and Community Development from 1986 aerial photographs and 1979 Planimetric Maps.

** Loudoun County Department of Planning, Zoning estimate based on 1986 aerial photographs and field surveys.

Existing Land Uses • Figure 5



Census Bureau as geographically scattered, relatively stable and slightly older than the County norm. In 1980, the median age of residents in the census tract which included the planning area was 31.6, nearly two years above the median age Countywide. Sixty-one percent of this population was reported to be between the ages of 18 and 62.* The average number of persons per household that same year in Census Tract 6007 was 2.92, which is less than the 3.05 persons per household average reported Countywide.** The median household income also differed between the County and the census tract which includes the Cub Run planning area. According to the 1980 census, the median household income for the County was $24,434; higher than the $20,583 reported for the census tract that same year.

C. Existing Zoning

The County's Zoning Ordinance is the basic tool for implementing the community land development policies of the Comprehensive Plan. Much of the existing zoning in Cub Run, however, is based on historical factors which may not appropriately reflect current influences and land use concerns in the area. The 593.2 acres of land zoned R-1 (single-family, one acre minimum lot size) lying to the south of Route 50, may reflect an erroneous assumption that this area would be suited to development with private wells and individual septic systems. In fact, however, extensive soil limitations in the area preclude residential development without central sewer provision. Dulles International Airport, directly to the north of the planning area, also poses concerns for any future residential development in the existing R-1 zones. All of the Cub Run planning area is located in, or adjacent to, areas projected for noise levels of Ldn 65 or greater, which are not considered suitable for residential development.*** By contrast, the remainder of land in Cub Run is zoned for commercial and industrial activities which are, in general, compatible with these high noise levels (See Figure 6, page 10).

Approximately 40% of the total land area in the Cub Run planning area is accounted for by 581.4 acres of I-1 general industrial land located

TABLE 2 — Approximate Acreage of Zoning Districts in the Cub Run Planning Area

Zoning Districts		Acreage	Percentage
R-1	Single-family, one acre minimum	593.2 ac.	44.9%
I-1	General Industrial	581.4 ac.	44.0%
LI	Light Industrial	122.9 ac.	9.5%
PD-GI	Planned Dev. General Indust.	10.0 ac.	.8%
100 Year Floodplain		10.0 ac.	.8%
C-1	Commercial	3.0 ac. (approx.)	—
		1,320.5 ac.	100.0%

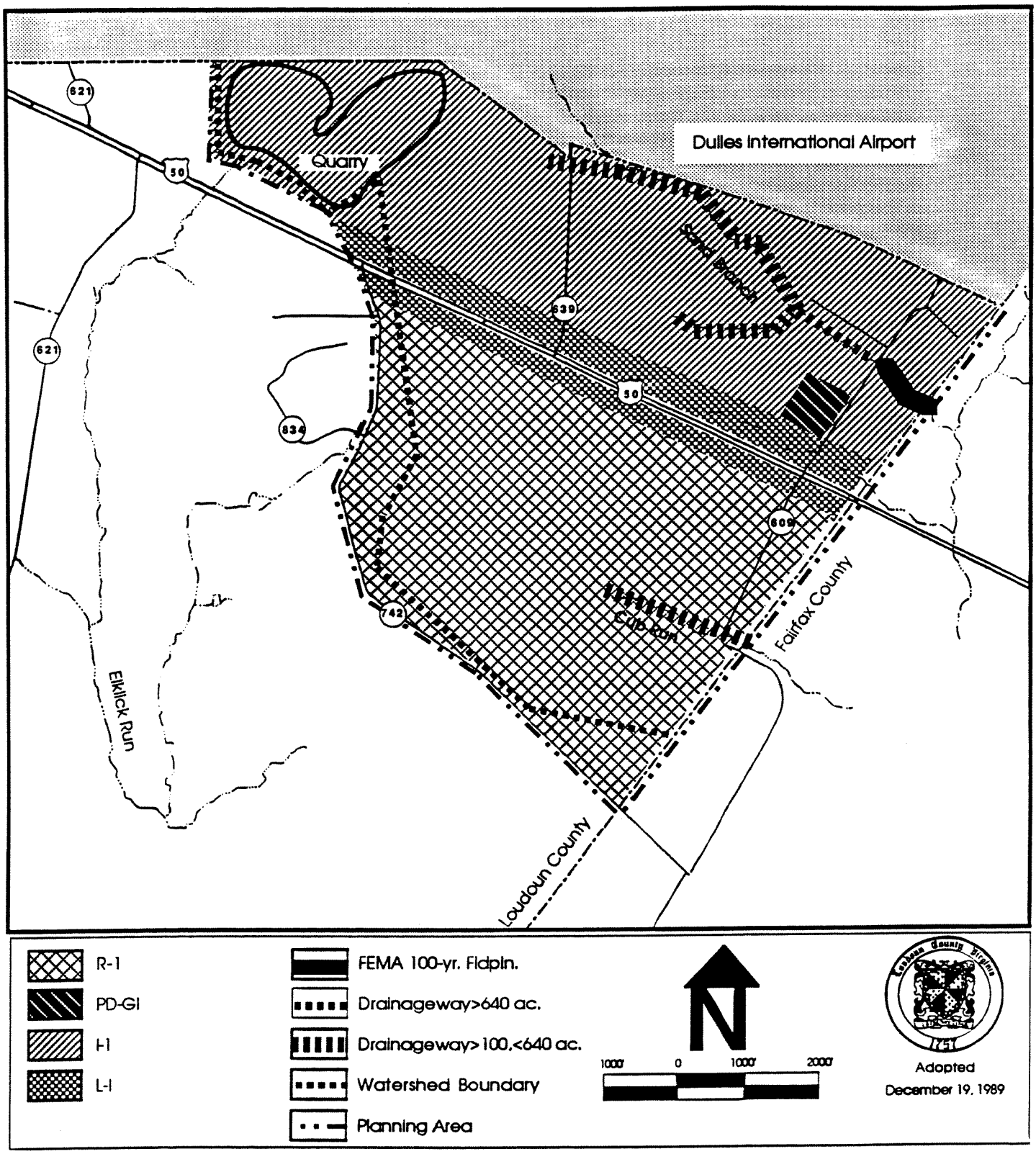
The general location of these zoning districts and of floodplains and drainageways in the area are shown in Figure 6, page 11.

* U. S. Bureau of the Census, 1980 Summary Tape File 3, Tabulation 15.

** U. S. Bureau of the Census, 1980 Summary Tape File 1, Tabulation 34.

*** Ldn: average day/night noise levels measured in decibels. Based on Peat, Marwick, Mitchell and Co. "Air Traffic Forecasts and Preliminary Noise Exposure" (June 1983), page 46.

Existing Zoning • Figure 6



immediately south of Dulles Airport, and a small 10 acre parcel of PD-GI (planned development - general industrial) land located near the Fairfax County line. Concurrent with the adoption of this plan, the County Board of Supervisors rezoned properties in the Cub Run Watershed which were zoned C-1 for commercial use, to a new light industrial district, LI. The LI district extends 500' to the north of route 50 and 300' to the south of Route 50. This zoning district allows for a wide range of light industrial uses and encourages consolidated entrances and appropriate landscaping along Rt. 50. A small area of C-1 zoning remains in the Cub Run planning area, outside the Cub Run Watershed. The approximate acreage of land in each zoning district is presented in Table 2, page 9.

D. Recent Development Activities

The Cub Run planning area has recently been the subject of increasing interest by the development community. The majority of development proposals have taken place on I-1 industrially zoned land to the north of Route 50. During the 1980's, several subdivisions and site plans for construction related activities were approved in the Wade Drive area, just off of Route 609.

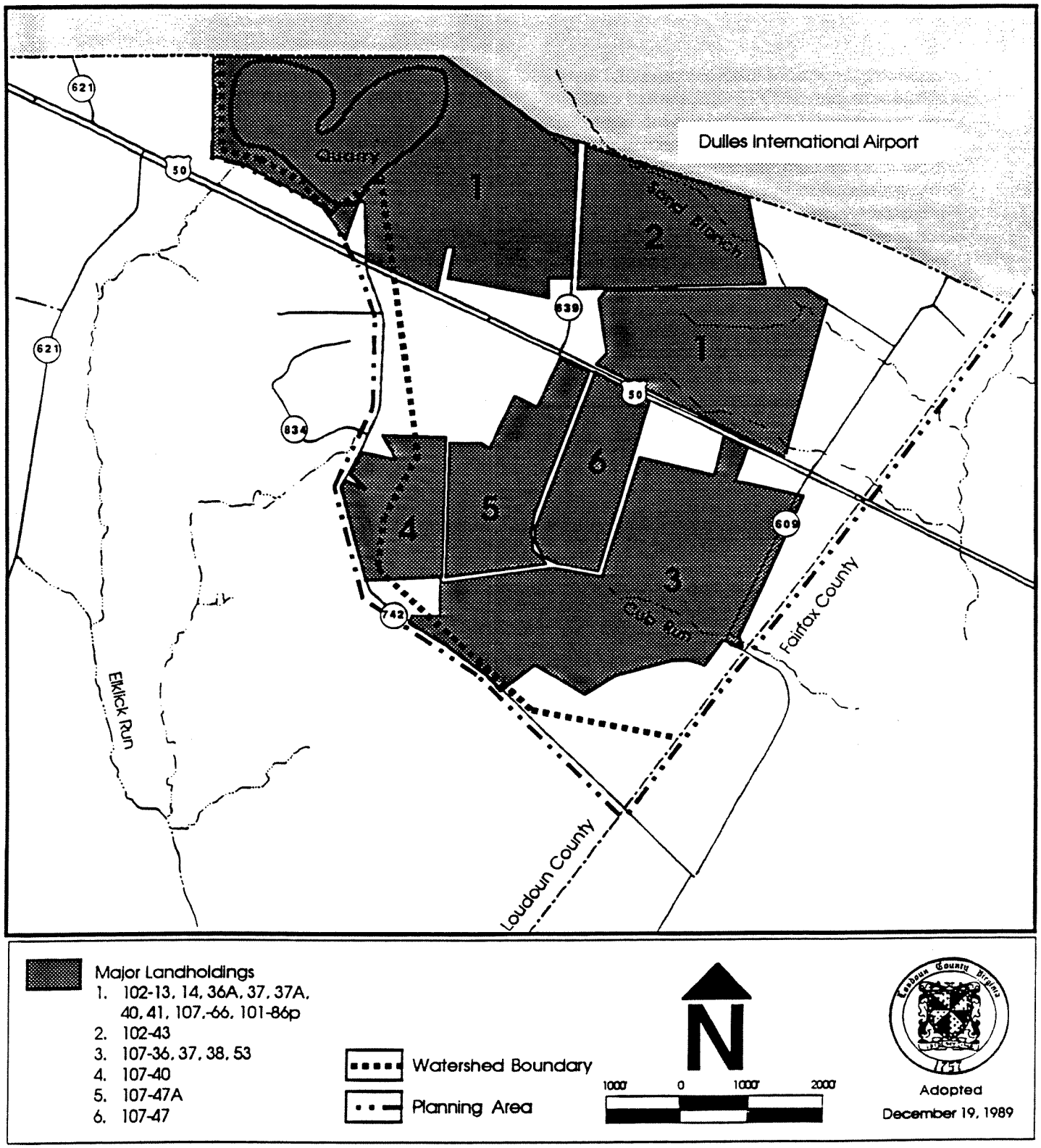
TABLE 3 — Major Landholdings in the Cub Run Planning Area over 40 Acres

May 20, 1987

Holding Number	Tax Map	Acreage	Zoning
1	102-13	56.46	I-1
	102-14	3.00	I-1
	102-36A	28.43	I-1, L-I (500' w)*
	102-37	50.05	I-1
	102-37A	20.02	I-1
	102-40	21.79	I-1
	102-41	3.00	I-1
	102-48	75.06	I-1, L-I (500' w)*
	107-66	30.77	I-1, L-I (500' w)*
	101-86 (portion)	60.00	I-1, L-I (500' w)*
		345.58	
2	102-43	100.18	I-1
3	107-38	87.34	R-1
	107-39	115.00	R-1
		202.84	
4	107-40	54.72	R-1
5	107-47A	76.57	R-1, L-I (300' w)*
6	107-47	44.78	R-1, L-I (300' w)*

* C-1 land rezoned by Board of Supervisors to new LI Zoning District. See Zoning Ordinance Amendment 89-04 and ZMAP 89-25.

Major Landholdings • Figure 7



Only one tract of land in the Cub Run planning area was undergoing review for rezoning as the draft plan was being prepared. In January 1986, the Lee Sammis Corporation submitted a proposal to rezone 27.12 acres of R-1 Land to PD-IP with a special exception for office uses. This parcel, which fronts on Route 609 south of Route 50, is adjacent to 160 acres of land owned by the applicant in Fairfax County. It is the intent of the applicant to develop an office park business center which will include the tract of land located in the Cub Run area as well as the Fairfax tract.

These activities indicate a growing interest in the Cub Run area among developers. However, if a significant amount of land development is to occur here in the future, central utilities and rezonings will be necessary.

E. Land Ownership

Cub Run is not typified by the very large agricultural landholdings which are characteristic of other rural portions of the County. The largest single parcel of land located in the Cub Run planning area is a 200 acre tract which lies to the south of Route 50. A portion of this property is currently used for agricultural purposes. The largest total landholding in the planning area is composed of several parcels which belong to an industrial, rather than an agricultural owner. Chantilly Crushed Stone, Inc. owns approximately 345 acres (26%) of land in Cub Run. Currently, approximately 75 acres of this property is actively used for quarrying operations. Bordered by Chantilly Crushed Stone properties on either side is a third large tract of land in single ownership. This 100 acre tract, zoned for industrial use, is vacant except for the Loudoun County Sheriff's Department firing range. A list of significant landholdings appears in Table 3, page 11. Figure 7, page 12 indicates the location of large landholdings in Cub Run.

F. Historic Resources

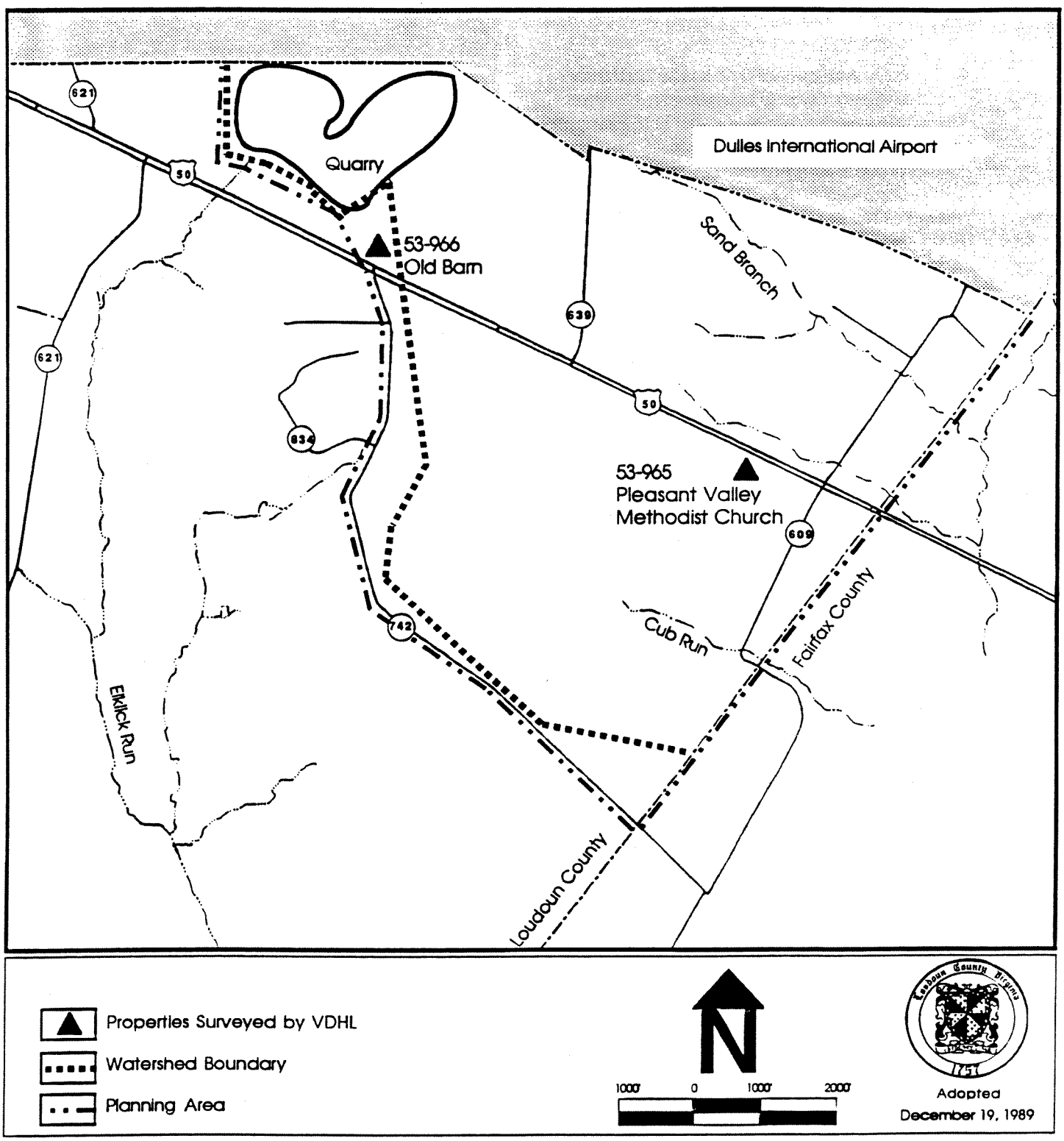
Two structures in the Cub Run planning area have been surveyed for historical significance by the Virginia Department of Historic Resources (VDHR). Pleasant Valley Methodist Church, located on Route 50, is a typical late 19th century wood frame church. A brick addition to the structure was constructed in the mid-20th century. The church is in good repair and maintains an active congregation. A barn, fronting on Route 50 at the Chantilly Crushed Stone quarry entrance, is the second structure recorded by VDHR. This barn, although currently abandoned and in dilapidated condition, is an example of a late 19th century barn architectural type uncommon in Loudoun County. Few barns in the County have a front central pediment with an angled window suggesting a diamond shape. The location of these structures is indicated in Figure 8, page 13.

G. Public Utilities and Facilities

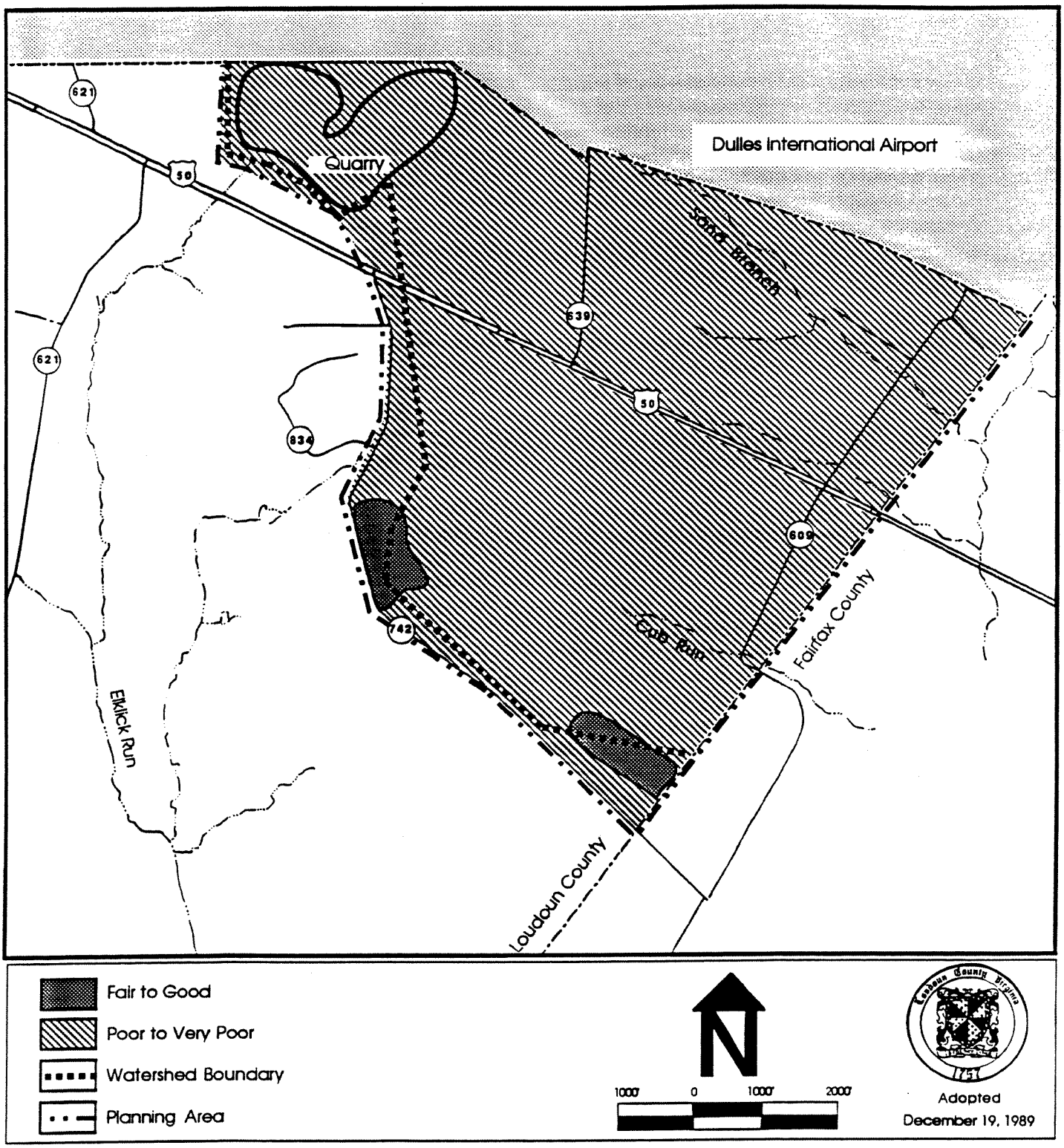
Public facilities and utilities such as schools, roads, sewers and libraries are elements which contribute to the structure and quality of a community. Accordingly, the mix of these services varies with the mix of land uses in a community. In some cases, the provision of utilities shapes the growth of an area, in others, growth or change creates needs and demands for facilities which did not previously exist. In any case, public facilities represent considerable investments which may become the responsibility of developers, the federal, state or local government, or residents themselves through the implementation of user fees or special taxing districts. Maintenance of public facilities, even after initial capital investments have been made, is an additional financial responsibility which should be anticipated.

In planning for the Cub Run area, the impact of certain public utilities on the type and timing

Historic Resourses • Figure 8



Septic Drainfield Suitability • Figure 9



of development must be understood and taken into consideration. Therefore, many of the decisions which influence the development of this area will center upon the type of public improvements which are needed and on whom the responsibility for financing and maintaining these improvements should fall. Existing facilities and utilities which serve the Cub Run planning area are described below.

1. Sewer

The Cub Run planning area is not served by central sewer service; therefore, residences, businesses and industries use individual, on-site sewage disposal systems. The potential for new on-site disposal systems and the reliability of existing systems in Cub Run are, however, severely limited by soil characteristics common to the Dulles South area. Loudoun County soil maps indicate an extremely small occurrence of soils in this area having good or fair potential for conventional septic drainfields. The majority of the soils are shallow to bedrock and have a seasonally high water table at or near the ground's surface (see Figure 9, page 15). Where shallow depth to bedrock is not a problem, very plastic "gooey" subsoils or clay layers further cause a high water table. These conditions result in inadequate percolation rates which will either not allow for proper absorption and filtering of effluent or which will not allow sewage effluent to remain in the soil long enough to undergo sufficient biological breakdown.

According to the County's Division of Environmental Health, unsuitable soils have posed ongoing problems for Dulles South where it is estimated that 80 to 90 percent of on-site sewage disposal systems in the area do not meet minimum standards of acceptability at some time during the year. Alternatives to conventional on-site sewage disposal systems are limited by cost and performance capabilities under these severe soil constraints. Further, it must be noted that the State Water Control Board (SWCB) does not consider package treatment plants as a viable sewer option for new development in Cub Run Watershed. Therefore, little or no new residential development and only limited commercial and industrial uses are foreseen until central sewer service becomes available in the Cub Run Watershed.

Clearly, the primary factor which will influence the intensity, timing and type of development in the Cub Run planning area is central sewer service. In June, 1986, the Loudoun County Sanitation Authority (LCSA), in cooperation with Camp, Dresser and McKee (CDM), consultants, completed an extensive feasibility study evaluating four alternatives for wastewater treatment in the Dulles South planning area which includes the Loudoun County portion of the Occoquan Watershed and the Upper Broad Run Watershed. Three options were determined to be feasible:

a. Conveying the wastewater with pumping facilities and interceptor sewers to the existing wastewater treatment plant owned and operated by the Upper Occoquan Sewage Authority (UOSA) in Centerville, Virginia, which discharges into a feeder stream of the Occoquan Reservoir;

b. Conveying the wastewater with pumping facilities to a new wastewater treatment plant, constructed, owned and operated by the Loudoun County Sanitation Authority (LCSA) within the Loudoun County portion of the Occoquan Watershed which would discharge to a feeder stream of the Occoquan Reservoir upstream of the UOSA treatment plant, and;

c. Conveying the wastewater with pumping facilities to a new wastewater treatment plant discharging to Broad Run, constructed, owned and operated by the LCSA to treat flows generated within both the Loudoun County portion of the Occoquan Watershed and the Broad Run Watershed.

Although each of these systems would be technically adequate to service the Occoquan portion of the Dulles South planning area, the feasibility and desirability of implementing

these options varies. The wastewater management alternatives studied in the LCSA report are evaluated not only on technical aspects but also on expected starting date of operations, projected environmental impacts, LCSA reliance on other jurisdictions and agencies for approval and permits, County control over facility operation and expansion, the ability of the system to accommodate wastewater flow beyond the year 2010, required effluent quality standards and projected cost associated with each alternative.

Based on these selection criteria, the recommendation of the LCSA study for long term treatment of wastewater generated in the Occoquan and Upper Broad Run Watersheds is for the construction of a new 5.0 mgd (million gallons per day) advanced wastewater treatment plant in the Broad Run Watershed with a pump-over from the Occoquan into the Broad Run Watershed. This proposed facility, including major trunk lines and pump stations, would be constructed in two phases at an estimated cost of approximately $86 million.

Although the recommended alternative of constructing a new sewage treatment facility in Broad Run would require State approval for an interbasin transfer, this approval is expected to be more easily obtained than permission to increase wastewater discharges into the Occoquan Reservoir. Additionally, this proposal does not rely heavily upon commitments by other jurisdictions and it allows the County total control over the operation of the new treatment facility. This proposal is also in keeping with the *Dulles North Area Management Plan* which recommends the location of a site for a new wastewater treatment plant in the Broad Run Watershed to serve development in the Dulles North area.

Prior to construction of the plant, wastewater would be treated at the Blue Plains Treatment plant via the Potomac Interceptor. Loudoun County has agreements with the District of Columbia to treat up to 17.93 million gallons of effluent until 2000, when the agreement will be renegotiated. After the year 2000, sewage effluent would be diverted by way of a new interceptor to the new treatment plant on the Broad Run Watershed.

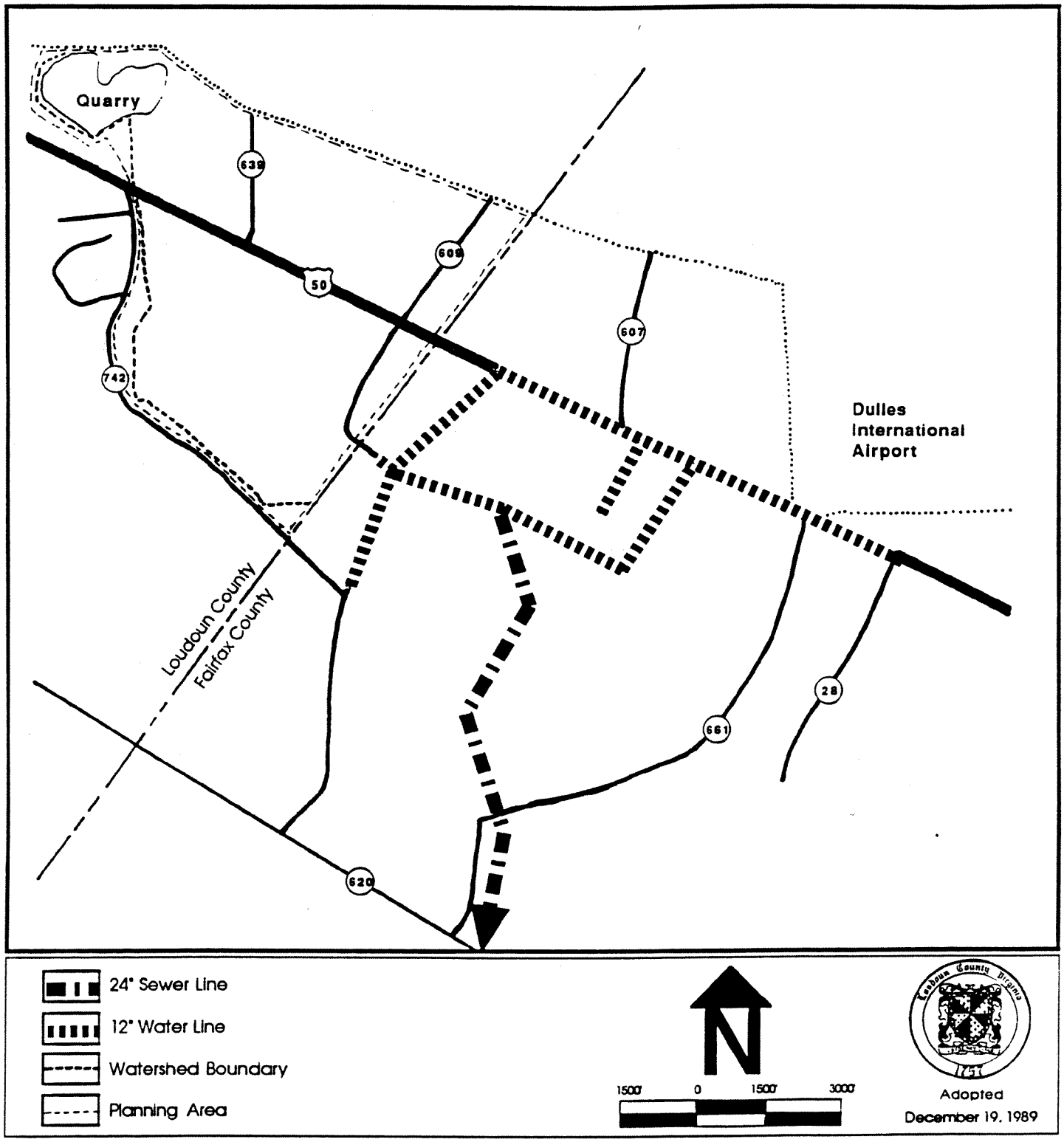
The findings of the CDM study relate directly to the possibilities of bringing central sewer facilities to portions of the Cub Run planning area. Figure 10, page 18 indicates the proximity of central sewer lines located very near the Cub Run study area in Fairfax County. In February, 1985, the Loudoun County Board of Supervisors requested the LCSA to initiate negotiations with Fairfax County for the extension of nearby sewer lines and the purchase of interim capacity in the Upper Occoquan Sewage Treatment Plant for the treatment of sewage generated in the Cub Run Watershed. In concert with these negotiations, and in order to plan for utilities consonant with anticipated growth in the Cub Run planning area, the Loudoun County Board of Supervisors adopted a resolution in February 1987 which approved, in concept, a long range plan for the treatment of sewage generated in the Cub Run Watershed. This resolution, which appears as an appendix to this plan, endorsed the concept of pumping over waste from the Cub Run Watershed to the Blue Plains Interceptor or to a new advanced wastewater treatment plant in the Broad Run Watershed.

2. Water

Currently, there is no central water service in the Cub Run planning area. Instead, businesses and residences rely on individual, private wells. A recent survey of Health Department records indicates that the depth of wells drilled in the Planning area since 1979 varies from a shallow depth of 61' to a relatively deep depth of 450'. Well yields in the area also vary. The average rate of water flow per well, measured in gallons per minute (gpm), ranged from 2 gpm to 20 gpm. As development in this area continues, increasing demands on underground water resources may pose uncertainties for the future in terms of water quality and availability.

The City of Fairfax owns and operates a water reservoir and treatment plant on Goose Creek, northwest of the planning area. The Treatment Plant currently has an average delivery capacity of 15 million gallons per day while Goose Creek, if developed with additional

Existing Sewer and Water Lines • Figure 10



impoundments, could yield some 30 million gallons per day. According to agreements between Fairfax City and Loudoun County, the County has "first call" on any water from the Goose Creek impoundment. Presently, the County's Sanitation Authority purchases approximately 4 to 4.5 million gallons of water a day from the City of Fairfax. In addition to the possibility of obtaining water from the Goose Creek impoundment, the Cub Run Watershed could possibly be served by an extension of Fairfax County water lines since Fairfax County water lines currently serve properties adjacent to the planning area. Figure 10, page 18 shows the location of these nearby water lines.

3. Transportation

Roads: The Cub Run planning area is bisected by Route 50, a four lane median divided facility, which provides access to the planning area from the east and west. Route 50 is the only primary road serving the area. The average daily traffic (ADT) count on Route 50 at the Fairfax County line in the Cub Run planning area is estimated to be approximately 15,000 based on June 1985 data. The estimated a.m. peak hour volume is 1,400 and the estimated p.m. peak hour volume is 1,600. Based on these data, Route 50 is operating at a level of service B or better within the boundaries of the planning area. The County estimates that traffic volumes in this area could double and still remain at an acceptable level of service.

Although Route 50 is operating effectively in the Cub Run area of Loudoun County, traffic builds up rapidly on the Fairfax side of the County line. Traffic counts taken in June 1985 in Fairfax County at the intersection of Route 50 and Route 28, approximately two miles from the Cub Run planning area, indicate that Route 50 operates at level of service D during a.m. and p.m. peak hours. These traffic levels on Routes 50 and 28 in Fairfax County may pose transportation constraints in the Cub Run area even though sufficient capacity is currently available on the Loudoun portion of Route 50. Proposed improvements to Route 28 which include upgrading this facility to a six lane freeway may alleviate these problems in the future.

The Cub Run planning area is also served by three hard surfaced secondary roads: Route 609, Route 639 and Route 742. These roads function primarily as local roads at this time, although Route 609 north of route 50 is rapidly developing as a light industrial employment corridor. None of these routes has been funded for improvements in the County's Six-Year Secondary Road Improvement Program. To date, the existing road network has adequately served the sparsely settled planning area. However, as growth and development continue to occur, the existing transportation system can be expected to suffer potentially significant decreases in levels of service.

Washington Dulles International Airport: The Cub Run planning area lies directly to the south of the one of the region's most important transportation facilities, Washington Dulles International Airport. Flight operations at Dulles Airport increased 25% between 1985 and 1986 and have continued to increase. Forecasts anticipate that by the year 2000, aircraft operations at Dulles will reach 394,000 per year and the airport will serve an estimated 7.5 million passengers. Proposed construction of an additional north-south runway in the next century would permit airport expansion to 740,000 aircraft operations per year.

The location of Dulles Airport has generated substantial employment investments in Loudoun as well as western Fairfax and Prince William Counties. The planning area's proximity to the airport places it in an excellent position to attract employers who depend on air transport of materials, personnel, and distribution of goods.

4. Recreation

Although there are no public recreational facilities located in the Cub Run planning area, there is a community center in Arcola, approximately four miles away, which is operated by the Loudoun County Department of Parks and Recreation. Outdoor facilities at the Arcola

Community Center include a tennis court, ballfields, a basketball court, a pavilion and a playground for young children. The center also offers a variety of community service programs for various age groups.

5. Public Safety

There is a volunteer fire department in the village of Arcola which answers calls from the Cub Run planning area. The fire company has an active membership of 11 volunteers in addition to two professional fire fighters who are "on-call" during weekdays. The fire station possesses a rolling stock inventory of two fire attack pumpers, one water tanker, two brush fire units and an ambulance.

The Loudoun County Sheriff's Department provides police protection for the planning area from its facilities in the Town of Leesburg.

6. Schools and Libraries

The Cub Run planning area is served by Arcola Elementary School which, in 1986, had an enrollment of 147 students and a use capacity of 465 students. The middle school which serves the area, Seneca Ridge Middle School, is located in Eastern Loudoun near Sugarland Run. Seneca Ridge also operated below its use capacity of 1,080 in 1986 as total student enrollment equaled 657. Broad Run High School is located north of Cub Run on Route 641 between Ashburn and Ryan. The high school has a use capacity of 1,193 and in 1986, had 1,052 students enrolled. Sterling Library, located in Sterling Park, is the primary library facility serving the Cub Run planning area. Projected development in the Dulles North area is expected to require additional schools and branch libraries which may eventually assist in serving the Cub Run area.

H. Natural Resources and Environment

One fundamental influence on land use is the natural environment. Generally, areas that are unsuitable for development are obvious, such as steep slopes, soils which will not percolate, low-lying swampy soils and unstable stream banks. Conflicts begin to occur, however, when environmental constraints are less obvious or when technological improvements can be employed to overcome environmental constraints to development. Historically, development in Cub Run has been severely limited by poor soils which have restricted the potential for on-site sewage disposal. Recently, however, rising development pressures have brought increased interest in overcoming these existing environmental constraints by providing central sewer and water service to the area. If new opportunities for development in the Cub Run planning area become available, they will doubtless result in changes which will affect the visual character and the natural environment of the area. This area plan will be valuable in striking a balance between the pressures and impacts of development and the preservation of important natural resources.

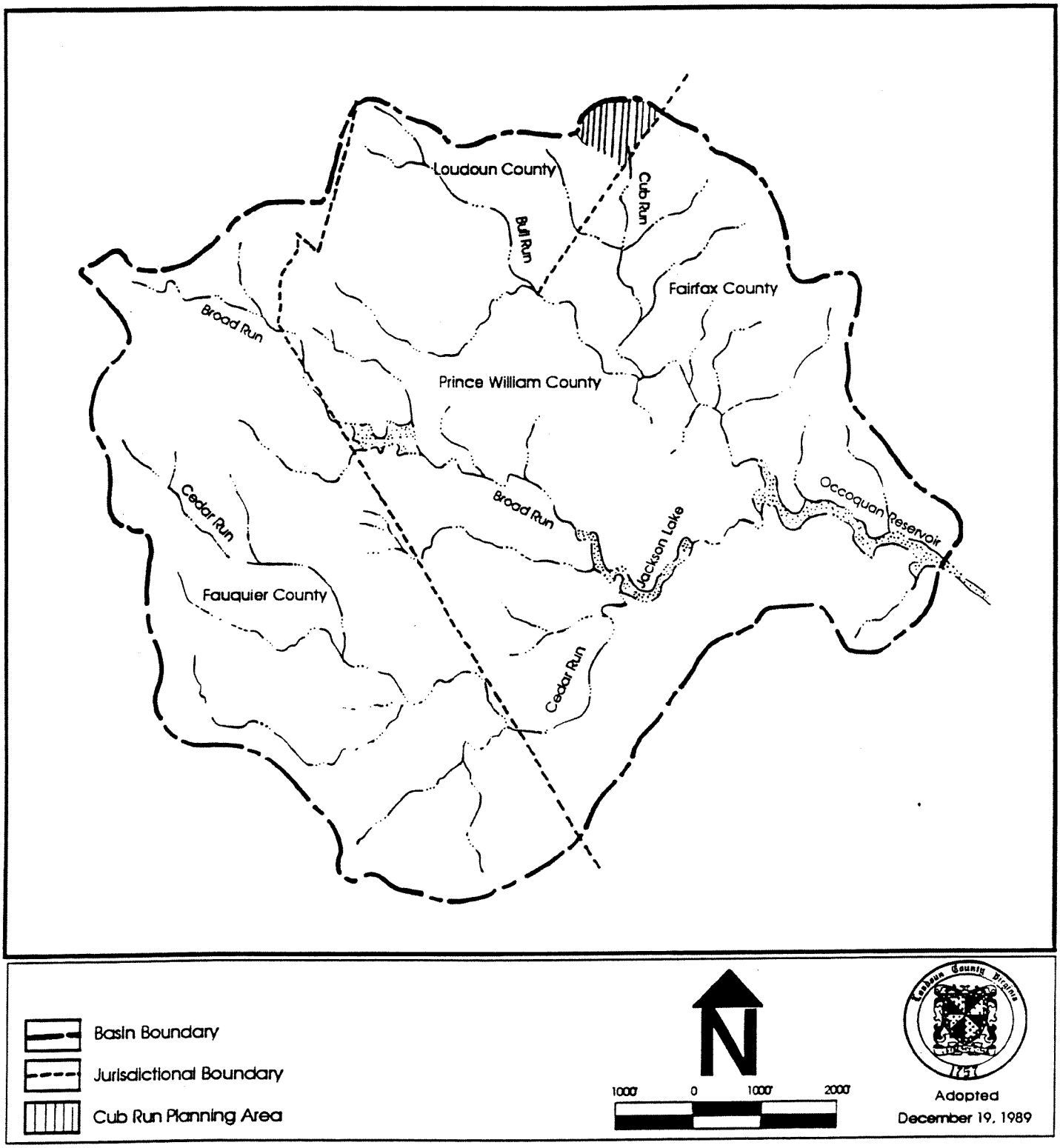
1. Water/Hydrology Resources

The Cub Run Watershed, which lies within the boundaries of the Cub Run planning area, is one of the three subwatersheds forming the Loudoun portion of the Occoquan Watershed. These subwatersheds drain into the Occoquan Reservoir, the primary source of drinking water for over 600,000 people in Fairfax and Prince William Counties. Sand Branch and an unnamed tributary of Cub Run, both located in the Cub Run planning area, flow southward to the Occoquan Reservoir via Bull Run (See Figure 11, page 21). The presence of these tributaries in the planning area creates conditions which require specific land use considerations.

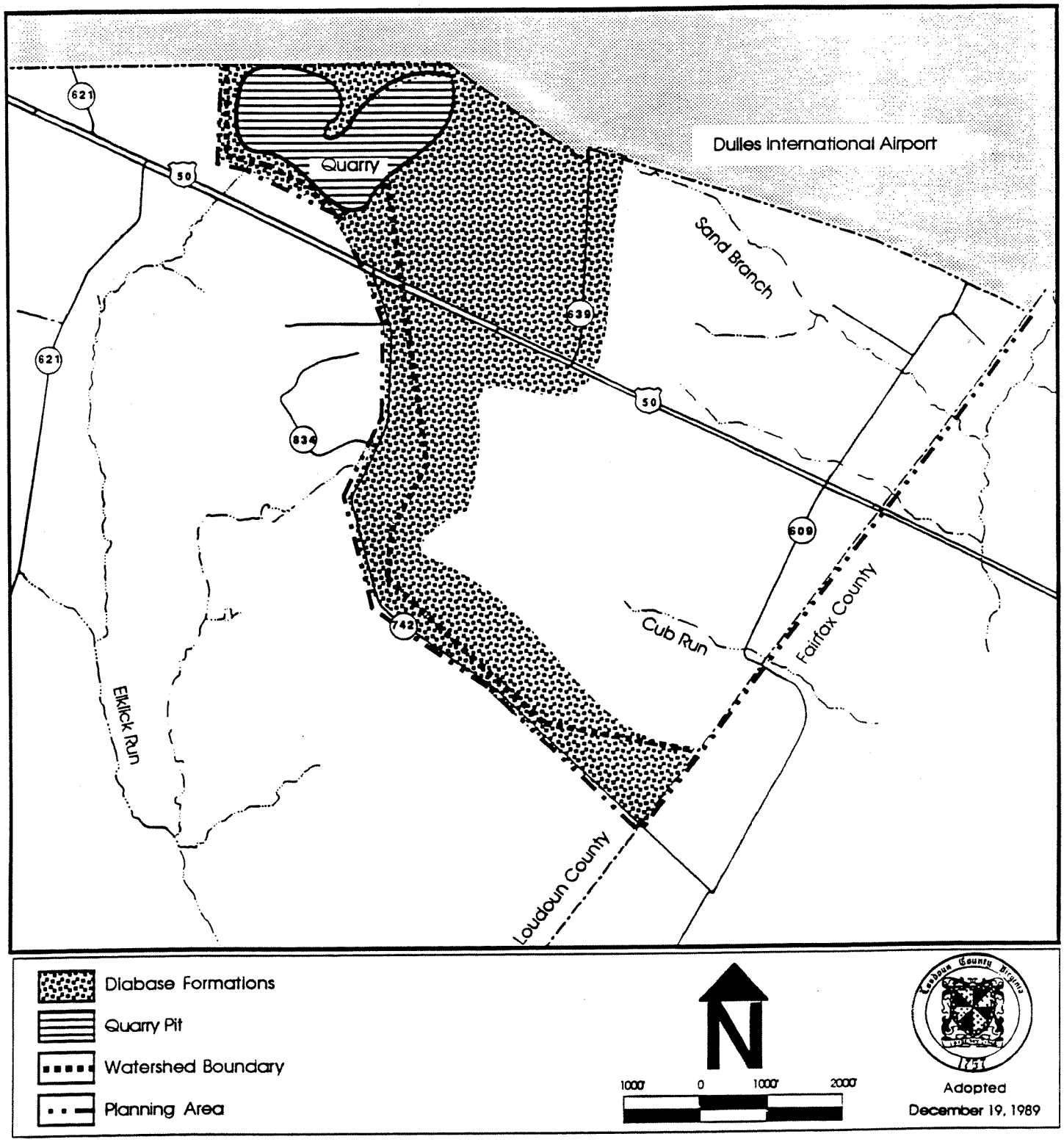
Ten acres of land in the Cub Run study area are located in the 100 year floodplain of Sand Branch as designated by the Federal Emergency Management Agency (FEMA). Existing County policy designates floodplain areas as environmentally critical. Therefore, land uses within 100 year flood zones are currently limited by the County Zoning Ordinance to primarily passive uses (i.e., parking, open space and recreation).

Preservation of water quality in the Occoquan Reservoir is a regional concern which

Occoquan Basin • Figure 11



Diabase Resources • Figure 12



should also influence land use in the Cub Run area. Non-point source pollution from run-off associated with various agricultural and urban land uses has been identified as a factor contributing to accelerated eutrophication (i.e., the premature aging of a water body) of the Occoquan Reservoir. Thus, if growth is to occur in the Cub Run planning area, review of future land use proposals must consider the influence of development on the area's water resources.

2. Geology/Mineral Resources

Geological formations present in the Cub Run planning area have been mapped by the United States Geological Survey and further refined by the Loudoun County Department of Natural Resources. The most significant geologic resource in the area is diabase rock which is quarried for crushed stone used to manufacture concrete and to build roads. The locations of diabase rock formations and of the active diabase quarry in the Cub Run planning area are indicated in Figure 12, page 24.

3. Topography/Steep Slopes

The Cub Run planning area is made up of level to gently undulating land ranging in elevation from approximately 250 to 350 feet above sea level. There are no substantial natural steep slopes greater than 15%. Manmade steep slopes do exist however, in the area of the quarry, due to diabase rock extraction.

4. Soil Resources

Soils located throughout the Dulles South area possess a number of characteristics which limit the area's suitability for various land uses. These soil conditions, which include perched water tables, clayey, plastic subsoils, and shallow depth to bedrock, lessen the agricultural productivity of land in the Cub Run planning area. Approximately one-half of the land in the planning area is considered to be secondary cropland because the combination of these soil characteristics affects root penetration, seedbed preparation and the water holding capacity of soils. The remaining land in the planning area, in terms of agricultural use, is suited for hay, pasture and woodland rather than cropping. Figure 13, page 24 illustrates the location of soils suitable for secondary cropland in the Cub Run planning area.

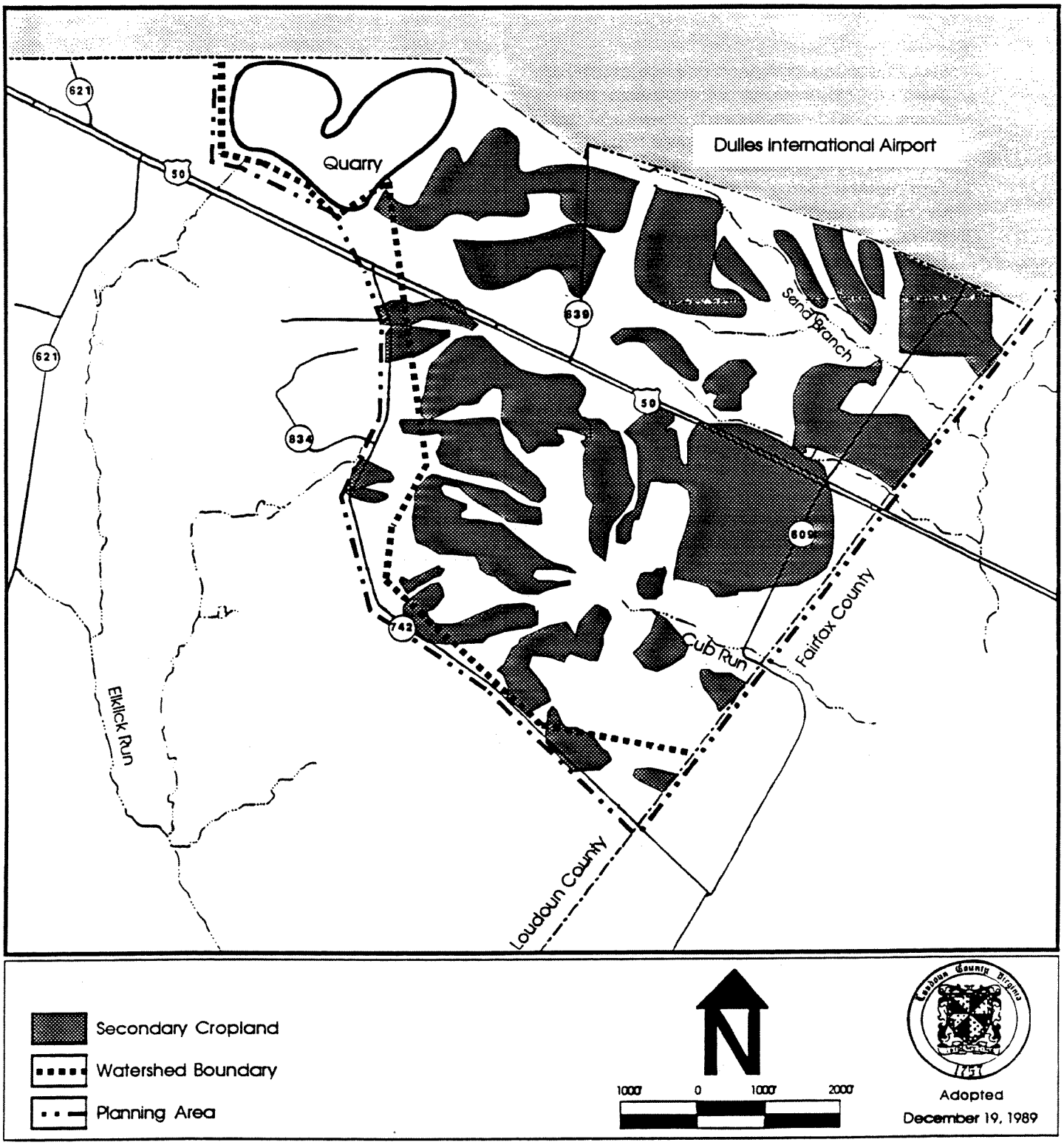
As discussed previously in the Land Use section of this plan, large sections of soils in the planning area are classified as having poor to very poor potential for residential septic systems and, in large part, have contributed to the sparse settlement patterns in the area. Even with the provision of central sewer service to the Cub Run Watershed however, these soils would present extensive engineering problems which must be overcome in order for safe development to occur. The construction of roads, basements and building foundations on soils with high water tables or on clayey soils, which swell and shrink, may result in problems ranging from major structural damage to cracked walls and wet basements. Figure 14, page 25 indicates the general development potential of soils in the planning area.

5. Forest and Wildlife Resources

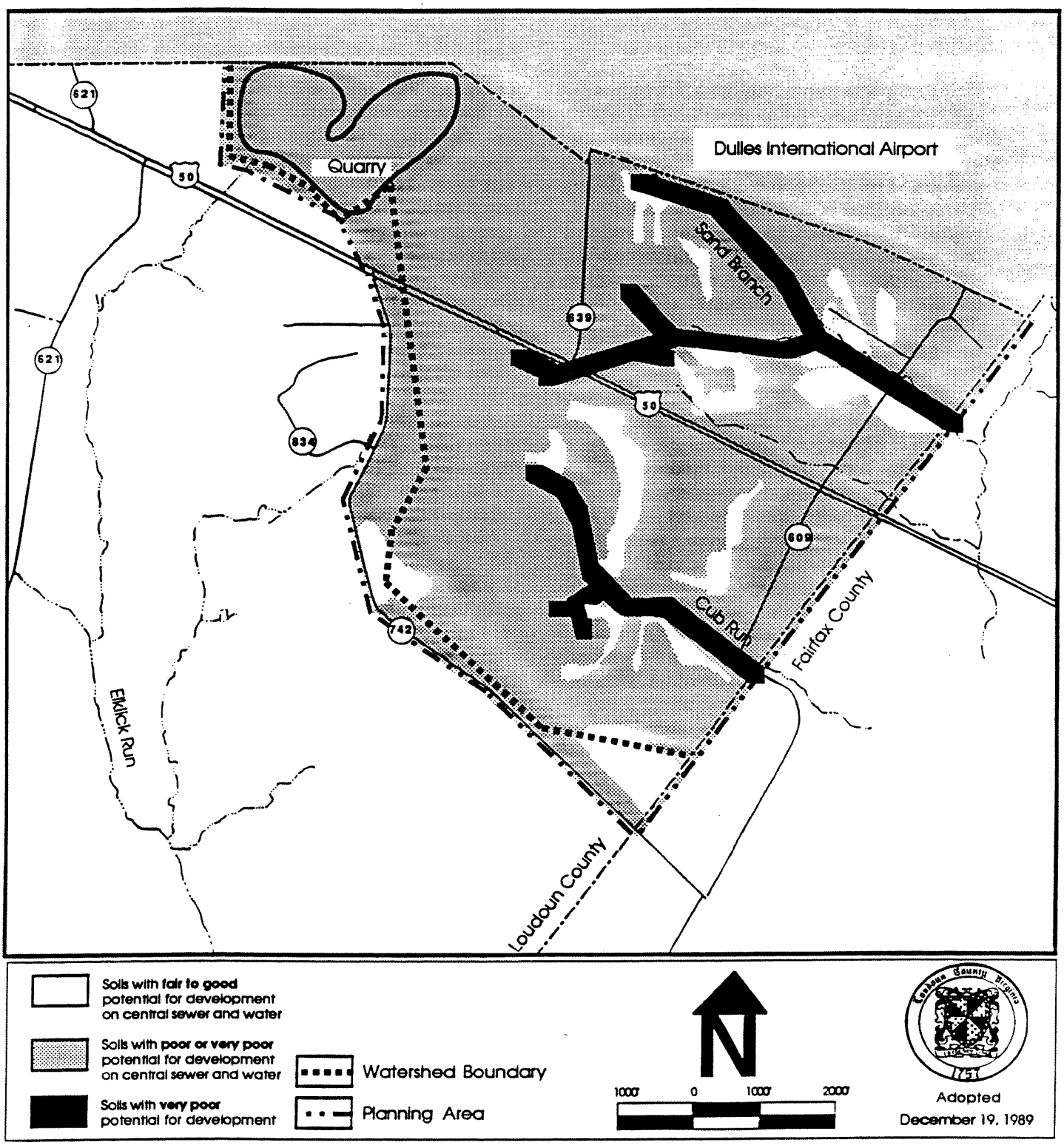
Small tracts of woodlands exist throughout the Cub Run planning area along watercourses and on abandoned agricultural land. Because the majority of soils in the area are naturally wet, trees and other types of vegetation generally have shallow root networks at or near the soil surface. Unless proper precautions are taken, high mortality rates for vegetation in this planning area can be anticipated if the water table is lowered due to grading or utility installation required for future development.

Changes in patterns of wildlife habitation can also be expected to occur as growth and development take place in Cub Run and neighboring planning areas such as Dulles North. Many forms of wildlife, deer in particular, may be driven into less developed areas of the County. Although there is no existing detailed inventory of wildlife species and habitats in the Cub Run planning area, or

Agricultural Soil Suitability • Figure13



Soil Development Suitability • Figure 14



the County as a whole, general wildlife management concepts should be considered when planning for new development. For example, linear corridors such as stream valleys, floodplains and utility right-of-ways function as key feeding, resting and breeding grounds for wildlife. These corridors can be preserved and incorporated into the design of new developments as utility and storm drainage easements, floodplain areas and open space.

6. Airport Noise

In 1986 a total of 278,307 aircraft operations took place at Washington Dulles International Airport, a 25% increase over the previous year. As the number of aircraft operations has increased at Dulles so has its importance as a regional "hub". Between 1985 and 1987, four airlines designated the airport as a regional "hub" and more airlines are expected to follow suit. Therefore, it appears quite possible that the airport will reach its year 2000 projected level of 394,000 aircraft operations well ahead of schedule. Such increases in operations are likely to generate a significant rise in ambient noise levels in the aircraft flight paths.

In 1982 the Federal Aviation Administration (FAA) commissioned Peat, Marwick, Mitchell and Co. as consultants to prepare a noise impact study as part of the airport Master Plan update. In order to determine the level of noise generated by airport traffic, the consultants used past aircraft arrival and departure routes and data from sound monitors stationed around Dulles. The sound impact of an overhead aircraft varies depending on (a) the route the aircraft follows which varies from flight to flight, (b) what a person or household is doing: watching T.V., sleeping, entertaining in the backyard, and (c) the time of year: winter with closed windows, summer with open windows.

There is an ongoing study to codify aircraft noise impact. In 1982 the FAA released the third version of an integrated Noise Model (Mod. 3.8) based on (a) the acoustical energy content at 500 Hertz (a note close to Middle C on a piano), (b) the noise event rise time and duration, and (c) the noise peak level. Two measures are available to display the results of the noise exposure calculations, grid cells and contours. Noise exposure can be calculated for the center of a grid of 40 acre cells surrounding the airport given certain aircraft types, arrival and departure routes, etc.

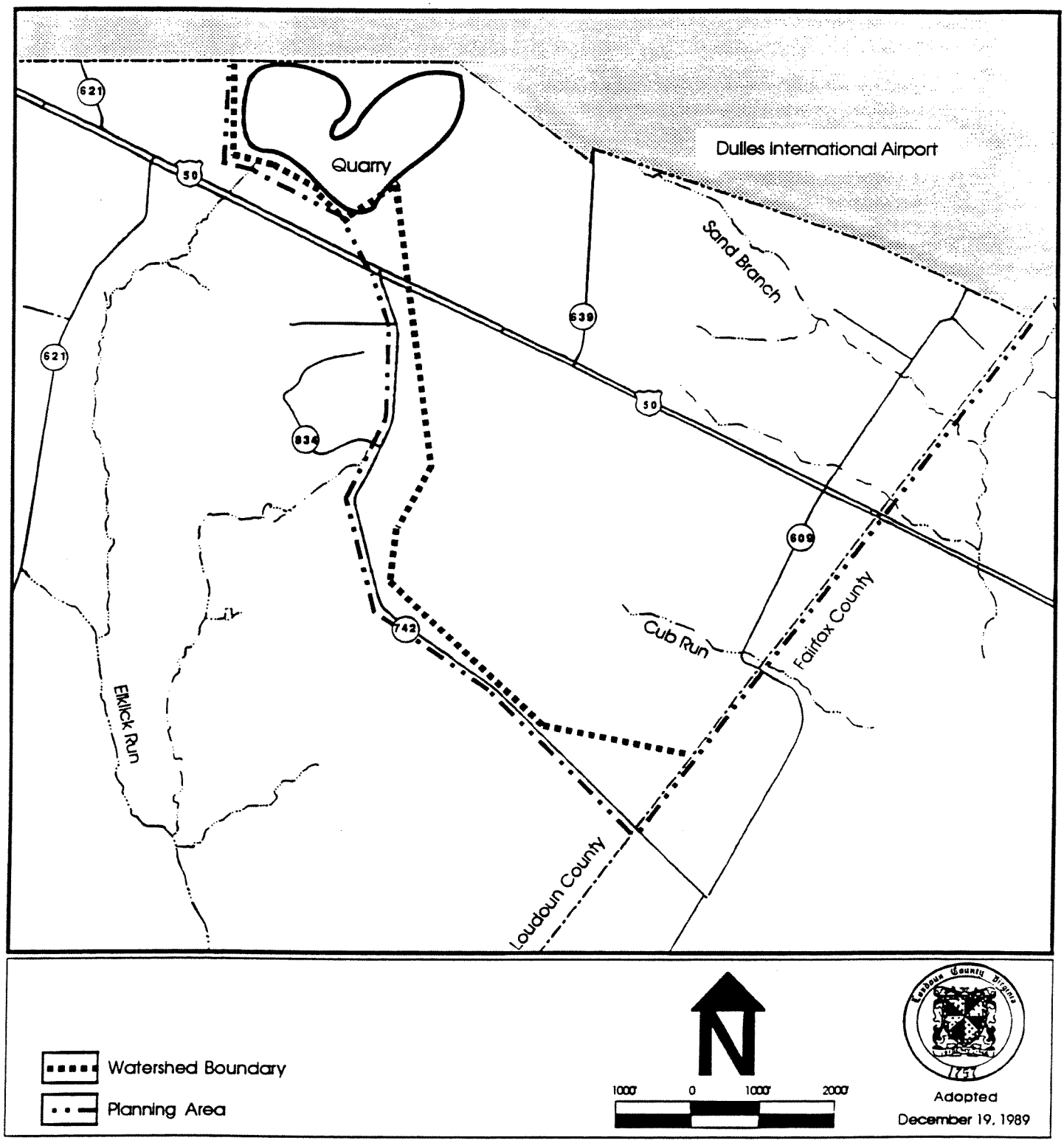
Noise contour lines can then be traced through these grid cells for predetermined noise exposure levels. Figure 15, page 28 shows the future full potential Ldn (average day/night noise levels measured in decibels) noise contour profiles for the Cub Run area. Weather conditions, angle of ascent or descent other than the eight degrees specified in the model, and pilot judgement will alter the detailed configuration of these routes and thus the precise boundaries of the noise zones.

A 1980 Federal Interagency report on noise and community reaction to noise levels is summarized in Table 4, page 27. The data indicate that below Ldn 55, community reaction to noise is slight while a certain amount of community stress may be expected in areas subject to Ldn 55-65. Significant negative community response may be expected in areas subject to Ldn 65-70 and HUD considers such areas undesirable for residential use. Very severe community reaction may be expected in areas subject to Ldn 70-75 and HUD would only consider approval of development in such areas if there were no alternative sites available to ease a pressing housing problem.

Peat, Marwick, Mitchell and Co., consultants for the Federal Aviation Administration, have developed a noise compatibility chart based on the U. S. Department of Transportation, "Federal Aviation Regulations, Part 150, Airport Noise Compatibility Planning."* The standards use slightly different Ldn noise classifications from those used by the Federal Interagency group and thus Table 4, page 27, has been adjusted to reconcile the two systems. It should be noted that the consultants' table assumes that the building itself will reduce sound by 20 decibels by means of sealed windows and the installation of

* "Final Report; "Federal Aviation Regulations", Part 150 Noise Compatibility Program, Washington/Dulles International Airport" (Jan. 1983), Exhibit 15.

Base Map • Figure 2



mechanical air handling systems. The consultants' recommendation for noise level reduction components would require construction devices in addition to sealed windows and mechanical air handling. The table further assumes that the County could obtain special enabling legislation from the Commonwealth of Virginia to implement unique deviations from the Virginia building code. Legislative experience, however, suggests that the prospect of obtaining such legislation in the near future is uncertain. Of course, little can be done to reduce sound either inside a building if windows are opened in warm weather or outside in yards and on patios. A particular land use thus ultimately becomes inappropriate for a given high ambient noise level and areas exposed to such noise should be planned for activities and uses which are not affected by high noise levels. Offices, for example, frequently have fixed windows and mechanical air systems and are not normally used as places to sleep. A quarry generates much noise by itself and would not be disturbed by overhead aircraft noise.*

Table 4 —Suggested Land Use Compatibility Standards in Aircraft Noise Exposure Areas

LAND USE	BELOW LDN 60	LDN 60 TO 65	LDN 65 TO 70	LDN 70 TO 75	LDN 75 TO 80
Residential:	Compatible (Slight community reaction to noise in the 45-65 range and moderate community reaction in the 65-80 range).	Compatible (Noise likely to be community issue).	Discretionary NLR** Required. (Noise a significant community issue).	Normally unacceptable NLR** Required (Noise a serious community issue).	Incompatible
Public Use:					
Schools, hospitals, etc.	Compatible	Compatible	NLR Required	Incompatible	Incompatible
Churches, auditoriums	Compatible	Compatible	NLR Required	Incompatible	Incompatible
Governmental services	Compatible	Compatible	Compatible	NLR Required	NLR Required
Transportation	Compatible	Compatible	Compatible	Compatible	Compatible
Parking	Compatible	Compatible	Compatible	Compatible	Compatible
Commercial Use:					
Offices: business, and professional	Compatible	Compatible	NLR Required	NLR Required	NLR Required
Wholesale and retail: building materials, hardware, farm equipment	Compatible	Compatible	Compatible	Compatible	Compatible
Retail trade--general	Compatible	Compatible	Compatible	Compatible	Compatible
Utilities	Compatible	Compatible	Compatible	Compatible	Compatible
Communication	Compatible	Compatible	NLR Required	NLR Required	NLR Required
Manufacturing & production:					
Manufacturing: general	Compatible	Compatible	Compatible	Compatible	Compatible
Photographic and optical	Compatible	Compatible	Compatible	NLR Required	NLR Required
Agriculture (except livestock) and forestry	Compatible	Compatible	Compatible	Compatible	Compatible
Livestock farming	Compatible	Compatible	Compatible	Compatible	Incompatible
Mining	Compatible	Compatible	Compatible	Compatible	Compatible
Recreational:					
Outdoor sports arenas	Compatible	Compatible	Compatible	Compatible	Incompatible
Outdoor amphitheaters	Compatible	Compatible	Incompatible	Incompatible	Incompatible
Nature exhibits and zoos	Compatible	Compatible	Compatible	Incompatible	Incompatible
Amusement: parks, resorts, etc.	Compatible	Compatible	Compatible	Compatible	Incompatible
Golf, riding and water recreation	Compatible	Compatible	Compatible	Compatible	Incompatible

*Based on Peat, Marwick Mitchell and Co. "Air Traffic Forecasts and Preliminary Noise Exposure" (June 1983), p. 26.
**Noise level reduction.

* Airport Noise discussion paraphrased from the *Dulles North Area Management Plan* (Oct. 1986), pp. 41-46.

Ldn Noise Contours - Full Potential • Figure 15